



SREB

Research Brief

Putting Lessons Learned to Work: Improving the Achievement of Vocational Students

by *Gene Bottoms*

State and local leaders create the conditions and policies that support schools' actions to improve student achievement. In efforts to raise the academic achievement of vocational students, leaders can call on the lessons learned from SREB's *High Schools That Work*. This report will examine three basic questions:

- What progress has been made in raising the achievement of vocational students?
- What things matter in raising student achievement?
- What actions can states take to improve high schools for vocational students?

Since 1987 the SREB-State Vocational Education Consortium has joined with schools to bring about significant gains in the reading, mathematics and science achievement of high school students who complete a concentration of courses in vocational studies. To raise academic achievement, participating schools become part of a comprehensive school-improvement effort. The emphasis is on raising expectations; getting vocational students to complete a core of advanced-level academic courses and a career/technical concentration of courses; teaching in ways that motivate these students to learn challenging content; involving parents in the advisement process; and using data to guide improvement efforts.

What progress has been made in raising the achievement of vocational students?

The SREB-State Vocational Education Consortium established several indicators for following schools' progress in advancing the academic achievement of vocational students. Based on these indicators, all participating states are making some progress. Most states have made more progress in mathematics and science than in reading. Overall, the academic achievement of vocational students has improved — as measured

by *HSTW* tests based on the National Assessment of Educational Progress. More students are meeting achievement goals, and more schools are posting better scores. The decade-long focus on vocational students is making a difference, but states need to increase their efforts to get 85 percent of these students to achieve at a level required for further learning in the workplace and in colleges and universities.

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Vocational students in *High Schools That Work* reaching the national averages of achievement for all students

In 2000 students from 635 schools that had participated in *High Schools That Work* for at least two years reached the national average for all high school students in mathematics. While progress has been made in reading, mathematics and science, there still are gaps in reading and science achievement. (See Table 1.)

No *HSTW* state had an average score at the national average or higher in reading. *HSTW*

states fared better in mathematics and science. Students in 12 consortium states (Alabama, Delaware, Florida, Hawaii, Indiana, Kansas, Kentucky, North Carolina, Oklahoma, South Carolina, Texas and Virginia) reached the national average in mathematics. Students in five consortium states (Indiana, Kansas, Kentucky, North Carolina and Virginia) reached the national average in science.

Vocational students at high-scoring sites approaching the 85 percent goal

In 2000 more than two-thirds of the students enrolled in vocational studies at high-scoring *HSTW* sites achieved the performance goals in reading, mathematics and science. These schools — the top 25 percent of participating schools — are those that most completely have embedded the *HSTW* key practices into school and class-

room practices. These schools are within reach of achieving the goal of getting 85 percent of vocational students to meet performance goals. Sixty-six percent of students at these high-achieving schools are meeting the reading goal, 73 percent are meeting the mathematics goal, and 69 percent are meeting the science goal. (See Table 2.)

Reaching the *HSTW* achievement goals

The *HSTW* achievement goals in reading, mathematics and science give schools and states targets in their efforts to prepare vocational students academically and technically for further study and jobs. These goals are linked to levels of

proficiency set for the National Assessment of Educational Progress. (See the sidebar on page 5.) *HSTW* students who meet all *HSTW* achievement goals have higher average NAEP scores than do students nationwide who plan to attend

Table 1
Average scores for *HSTW* students
compared with national averages for all high school students in 2000

	Students at <i>HSTW</i> sites	All high school students
Reading	275	287
Mathematics	299	299
Science	289	293

Source: The data from *HSTW* sites are taken from the *High Schools That Work* Assessment (based on the National Assessment of Educational Progress) of 12th-graders who completed three or four credits in a planned sequence of vocational courses at 635 high schools. The national averages for all students are taken from a national sample of results on the 12th-grade NAEP assessment.

Table 2
Percent of students at high-scoring
HSTW sites who met performance goals in 2000

	Meeting goals	Target
Reading	66%	85%
Mathematics	73	85
Science	69	85

college. Between 1994 and 2000, the proportion of *HSTW* students who met the achievement goals in reading and science increased from

about one-third to more than one-half. In mathematics, the proportion increased from about one-third to 61 percent. (See Table 3.)

Seeking higher levels of achievement

The “proficient” and “advanced” levels are NAEP’s highest levels of proficiency. The national average scores of college-preparatory students in reading, mathematics and science are at the proficient level. Students who score below the NAEP “basic” level have minimal skills in reading, mathematics and science. Their scores show that they have not mastered secondary-level work and certainly lack the skills for college work. The

good news is that there has been a decline in the percentage of vocational students at *HSTW* sites who score below basic in mathematics and science on the NAEP-based *HSTW* Assessment. In 2000, only 4 percent scored below basic in mathematics and only 6 percent scored below basic in science. Vocational students’ greatest weakness is in reading: Thirty-two percent scored below basic in reading in 2000.

Increasing the number of improving schools

The number and percentage of schools posting improved scores on the NAEP-based *HSTW* Assessment increased dramatically from 1996 to 1998, compared with growth from 1994 to

1996; however, the percentage of schools showing improvements declined between 1998 and 2000. (See Table 4.)

Table 3
Percent of students who met the *HSTW* achievement goals

	Reading	Mathematics	Science
1994	33%	34%	39%
2000	51	61	55

Table 4
Percent of *HSTW* schools with increased scores

	Number of schools	Percent of schools with increases in scores		
		Reading	Mathematics	Science
1994 to 1996	260	49%	60%	53%
1996 to 1998	444	63	85	82
1998 to 2000	635	46	49	52

Increasing the achievement of African-American students

States and schools in the SREB-State Vocational Education Consortium face a challenge in helping African-American students who are completing vocational studies to meet higher achievement standards. While these students' achievement has improved in all three areas (reading, mathematics and science), a major gap exists between the achievement of African-American students and of white students. (See Table 5.) The widest gap is in science. Among vocational students, about the same percentages of African-American students and white students complete college-preparatory English, mathematics and science courses, but the achievement levels are not the same. Based on visits to hundreds of high schools in the last 10 years and on data from *HSTW* Assessments during that period, SREB has concluded that two key reasons for the disparity

are the quality of instruction and the standards to which African-American students are held.

Some states are using end-of-course exams linked to comprehensive accountability systems to improve instruction and raise standards for all students. Such exams may help increase the achievement of African-American students. In North Carolina — a state that has given end-of-course exams since 1986 — more than half of the African-American students who participated in the 2000 *HSTW* Assessment met the *HSTW* goal in mathematics. In all consortium states, about 35 percent to 40 percent of the African-American students who took the assessment met that goal. North Carolina's African-American students also scored significantly higher in reading, mathematics and science than African-American students at *HSTW* sites in other states.

Table 5
Percent of African-American students and white students meeting *HSTW* achievement goals in 2000

	African-American students	White students
Reading	35%	55%
Mathematics	41	68
Science	33	64

Meeting *HSTW* achievement goals: What students know and can do

Reading (279)

The current reading goal corresponds to NAEP's "basic" level of performance, a standard for partial mastery that is lower than the "proficient" standard. The long-range intent is to increase the goal to the "proficient" level. At the "basic" level, students can, among other things:

- seek and use information from manuals, journals, periodicals and other documents;
- use information from several sources to make interpretations, draw conclusions and identify and solve stated problems; and
- recognize limitations in available information.

Mathematics (295)

The mathematics goal corresponds to NAEP's "proficient" level of performance, a standard for mastery of challenging subject matter. Students can, among other things:

- understand concepts from algebra, geometry and probability;
- apply concepts from algebra, geometry and probability in solving multistep problems; and
- explain reasoning in various problem-solving situations.

Science (292)

The science goal corresponds to NAEP's "proficient" level of performance, a standard for mastery of challenging subject matter. Students can, among other things:

- apply knowledge, skills and reasoning to interpret scientific and technical data from tables;
- make inferences about outcomes of experimental procedures;
- evaluate the appropriateness of an experiment's design; and
- interpret scientific text and graphs.

What things matter in raising student achievement?

By working directly with schools since 1988 and with a continual data-collection system, SREB has identified school practices that help improve academic achievement and that distinguish high achievement from low achievement. It matters that:

- students complete a challenging curriculum;
- districts and states increase graduation requirements;
- students take algebra by the end of grade eight and a mathematics course in their senior year;
- vocational teachers stress academic knowledge and skills;
- teachers set high expectations and make assignments that engage students;
- students receive the extra help needed to meet higher standards;

- students receive early and continual guidance and advisement from caring adults;
- students meet curriculum and achievement goals; and
- vocational students are held to demanding standards for technical achievement.

1. It matters that students complete a challenging curriculum.

For states to increase significantly vocational students' achievement in reading, mathematics and science, these students will need to complete more challenging courses. States need to establish policies that encourage students to complete such courses. Students who complete challenging English, mathematics and science courses score higher on achievement tests and are more likely than other students to succeed in college and the workplace, according to studies of *HSTW* sites by MPR Associates Inc. (for the National Center for Research in Vocational Education) and by the Research Triangle Institute.

The percentage of vocational students who completed all three academic areas (reading, mathematics, science) of the *HSTW*-recommended curriculum (see sidebar below) increased from just 3 percent in 1988 to 34 percent in 2000. Vocational students in 2000 who completed all three areas had significantly higher achievement than those who did not complete all three areas. (See Table 6.)

The percentage of students who completed the *HSTW* English curriculum increased from 7 percent in 1994 to 45 percent in 2000.

The percentage of students who completed the *HSTW* mathematics curriculum increased from 29 percent in 1988 to 85 percent in 2000. The percentage of students who took at least one year of mathematics below college-preparatory algebra decreased between 1998 and 2000, while the percentages of students who completed college-preparatory Algebra II and geometry increased. (See Table 7.)

The percentage of students who completed the *HSTW* science curriculum increased from 16 percent in 1988 to 62 percent in 2000. Between 1998 and 2000 there was a decrease in the average number of credits students took in low-level basic and general science courses — from 1.8 to 1.7 credits. During that same period, the average number of credits that students took in college-preparatory-level science courses such as biology, chemistry and physics increased from 1.7 to 1.9

The *HSTW*-recommended curriculum

- four credits in English courses with content and achievement standards comparable to college-preparatory/honors courses
- three credits in mathematics courses, including two credits in courses with content and achievement standards comparable to college-preparatory Algebra I, geometry or Algebra II
- three credits in science, including two credits in courses with content and achievement standards comparable to college-preparatory biology, chemistry, physics or applied physics
- four credits in a planned sequence of career and technical studies and two related credits, including a computer literacy course

Table 6
Average scores of students who completed and did not complete
all three academic areas of the *HSTW* curriculum, 2000

	Completed the curriculum	Did not complete the curriculum
Reading	286	270
Mathematics	310	294
Science	300	284

credits. The most dramatic increase occurred in Integrated Science, a multi-year program of study that draws upon earth science, physical science,

biology, chemistry and physics. In 1998, 9 percent of vocational students took Integrated Science; in 2000, 14 percent did. (See Table 7.)

2. It matters that districts and states increase graduation requirements.

There is a clear connection between vocational students' academic achievement and the courses they take in high school. While consortium states have made progress in improving student achievement, none requires vocational students to complete the *HSTW*-recommended curriculum.

A survey of consortium states revealed the following:

- Only one consortium state (New York) requires all students to complete the *HSTW*-

recommended language arts curriculum (four college-preparatory English courses).

- Eleven consortium states (Alabama, Arkansas, Delaware, Kentucky, Louisiana, Mississippi, New York, Oklahoma, Texas, Virginia and West Virginia) require all students to complete at least three credits in mathematics, including two at the college-preparatory level, and one state (North Carolina) encourages students to complete such courses.

Table 7
Percentages of students completing
mathematics and science courses at *HSTW* sites

	1998	2000
Below college-prep algebra	99%	86%
College-prep Algebra I	62	64
Algebra II	65	72
Geometry	77	83
Integrated Science	9	14
Chemistry	59	63
Physics/applied physics	27	30

- Eight consortium states (Arkansas, Delaware, New York, Oklahoma, South Carolina, Texas, Virginia and West Virginia) have adopted the *HSTW*-recommended science curriculum.
- Six states (Alabama, Georgia, Mississippi, North Carolina, Tennessee and West Virginia) require students to complete either a career concentration of courses or additional academic courses.

Increasing the number of credits that students must complete in order to graduate from high school improves student achievement. It also is important to require students to take high-level courses. Many schools with higher graduation requirements have gone to block scheduling, which allows students to earn 32 credits instead of the 24 credits available in a traditional schedule of six periods per day.

SREB analyzed data from 330 of the 635 schools that participated in the 1998 and 2000 *HSTW* Assessments. Of these schools, 146 required between 20 and 23 credits; 184 schools required between 24 and 30 credits. The data showed that schools that required 24 to 30 credits for graduation had higher student achievement than schools that required 20 to 23 credits. The schools with higher requirements exceeded the *HSTW* goals in mathematics and science, while schools that required 20 to 23 credits for graduation did not reach the goals. At the 18 *HSTW* sites that used block schedules and required 24 to 30 credits, including four in mathematics and four in science, average scores on the *HSTW* Assessment improved six points in reading, seven points in mathematics and seven points in science between 1998 and 2000. (See Table 8.)

3. It matters that students take algebra by the end of grade eight and a mathematics course in their senior year.

Vocational students who take algebra by the end of grade eight have significantly higher mathematics achievement as graduating seniors than do students who take algebra later. SREB's Making Middle Grades Matter initiative has urged states to require all students to complete

either algebra or pre-algebra by the end of grade eight under a qualified mathematics teacher. The number of students who completed algebra by the end of grade eight increased from 35 percent in 1998 to 40 percent in 2000. (See Table 9.)

Table 8
Gains in *HSTW* Assessment scores between 1998 and 2000
at *HSTW* sites with traditional schedules and block schedules

<i>HSTW</i> Assessment tests	Traditional schedule; 20 to 23 credits required (74 schools)	Block schedule; 20 to 23 credits required (72 schools)	Block schedule; 24 to 30 credits required (165 schools)	Block schedule; 24 to 30 credits required; and required curriculum of four mathematics and four science credits (19 schools)
Reading gains	0 points	0 points	2 points	6 points
Mathematics gains	3 points	2 points	4 points	7 points
Science gains	2 points	1 point	5 points	7 points

Source: NAEP-based *HSTW* Assessments, 1998 and 2000

Table 9
**Vocational students taking algebra by the end of grade eight
and mathematics and science in grade 12 at *HSTW* sites, 2000**

	Took course		Did not take course	
	Percent of students	Average score on <i>HSTW</i> Assessment	Percent of students	Average score on <i>HSTW</i> Assessment
Algebra by the end of grade eight	40%	307	60%	295
Mathematics in grade 12	62	302	38	296
Science in grade 12	52	293	48	286

Taking a mathematics course in grade 12 significantly increases student achievement. (See Table 9.) The SREB report *Reducing Remedial Education: What Progress are States Making?* notes that “students who skip mathematics in their senior year are out of practice when they enter college and, not surprisingly, often need refresher courses.” The report also says that evidence from

SREB states “suggests that students are less likely to need remedial courses if they complete a core of challenging academic courses in high school and take a high-level mathematics course in the senior year.” Further, the 57 percent of students at urban *HSTW* sites who completed four years of mathematics had an average mathematics score that met the *HSTW* goal.

Advantages of block scheduling in raising the achievement of vocational students

A block schedule enables schools to:

- increase the number of advanced-level mathematics and science courses and enroll students in mathematics and science in their senior year;
- require unprepared ninth-graders to take “double doses” of language arts/reading and mathematics;
- increase opportunities for students to retake failed courses and to graduate with their peers, reducing the likelihood that they will drop out of school;
- improve instruction by giving teachers more time to plan and to engage students in learning;
- get students to complete four credits above the core of academic courses in either an academic or a career concentration; and
- improve relationships between teachers and students. A block schedule contains fewer periods per day, which means that teachers have fewer students to get to know. Also, fewer periods mean fewer class changes and fewer opportunities for students to misbehave.

HSTW stresses that vocational students should take either a mathematics or a science course — or both — in their senior year. *HSTW* sites have made progress in getting vocational students to do so. The percentage of vocational students who

took mathematics in grade 12 at *HSTW* sites increased from 41 percent in 1988 to 62 percent in 2000; the percentage who took science in grade 12 increased from 25 percent in 1988 to 52 percent in 2000. (See Table 9.)

4. It matters that vocational teachers stress academic knowledge and skills.

The more often vocational teachers emphasize communication and mathematics skills, the more apt their students are to meet the *HSTW* achievement goals, according to an outside study of the progress of *HSTW* sites between 1996 and 1998. Yet little or no progress was made between 1996 and 2000 in increasing the percentage of vocational teachers who often stressed academic content. (See Table 10.)

Over the last four years, *HSTW* staff members have conducted technical assistance visits at more than 300 *HSTW* sites. Classroom observations

and interviews with vocational teachers have revealed that about one-half of the vocational teachers are not prepared to integrate academic content into vocational assignments. A teacher survey in 2000 revealed that almost one-half of vocational teachers in the *HSTW* network said they needed training in how to integrate reading, writing, mathematics and science content into their courses. During the last three years, fewer than 10 percent of vocational teachers received more than 20 hours of such training. (See Table 11.)

5. It matters that teachers set high expectations and make assignments that engage students.

Students who prepare major research papers, complete short writing assignments, make oral presentations, read several books and use computers to prepare assignments have higher average reading scores than students who lack these experiences. The percentage of students who participated in these learning experiences at *HSTW* sites increased slightly between 1998 and 2000.

Mathematics achievement improved when teachers encouraged students to talk about mathematics and use it in solving real-world problems. Students who reported that they worked in groups to solve difficult mathematics problems — 86 percent of vocational students at *HSTW* sites that participated in the 2000 *HSTW* Assessment — had a higher average score than students who

Table 10
Percent of *HSTW* students using academic skills
to complete vocational assignments

	1996	2000
Students reported that their teachers often stressed:		
Mathematics skills in completing vocational assignments	54%	52%
Reading skills in completing vocational assignments	42	45
Writing skills in completing vocational assignments	44	45

Table 11
Vocational teachers who needed and received staff development, 2000

	Teachers who needed staff development	Teachers who received more than 20 hours in the last three years
Reading and writing across the curriculum	42%	12%
Mathematics content and methods	46	6
Science content and methods	46	6
Revising vocational courses to meet national standards	47	12
New teaching methods for getting students to work harder	48	12

Source: 2000 survey of vocational teachers at *HSTW* sites

worked alone. Mathematics teachers want to learn how to help more students understand concepts in mathematics. Only 10 percent of mathematics teachers at *HSTW* sites said that, in the last three years, they had received more than 20 hours of staff development in mathematics content and new instructional methods. However, 46 percent said they needed this type of training.

Students whose science teachers required them to write and talk about science and to work in groups on challenging science assignments had higher scores in science than students who did not have these experiences. Students who made presentations on science and prepared written

reports on scientific topics once or twice a year had average scores that exceeded the *HSTW* science goal. Students who missed these experiences had average scores that were below the goal. Only 18 percent of science teachers at *HSTW* sites said that, in the last three years, they had received more than 20 hours of staff development to upgrade their content knowledge and to learn new instructional methods. Fifty-five percent said they needed such staff development.

The 2000 *High Schools That Work* Assessment showed that more students need teachers who believe that all students can learn challenging content, who establish clear expectations for

Engaging Students in Learning

The 2000 *High Schools That Work* Assessment showed that more students need teachers who can engage them in serious learning.

- Fifty-four percent of students read more than two books in 12th-grade English classes.
- Eighteen percent of students often discussed and debated with other students what they had read in English classes.
- Forty-five percent of students used a graphing calculator daily or weekly to complete mathematics assignments.
- Forty-five percent of students read more than two books or articles about science.
- Forty-four percent of students used a computer to complete a vocational assignment at least weekly.

Expecting more of vocational students

The 2000 *High Schools That Work* Assessment showed that teachers expect too little of vocational students.

- Thirty-four percent of vocational students said teachers let them get by without doing the work.
- Fifty-six percent said their teachers often did not indicate the quality of work needed for an A or B.
- Sixty-five percent said they seldom were asked to revise essays several times to improve quality.
- Thirty percent said they never were encouraged to take more mathematics courses.
- Thirty-five percent said they never were encouraged to take more science courses.

student work and who care enough to ensure that students meet these standards.

Students who do homework have higher achievement on average than students who do not do homework. Those who do one hour of homework are more likely to meet the *HSTW* achievement goals in reading, mathematics and science than are students who do less homework, according to a study by the Research Triangle Institute. Vocational students who do homework for vocational courses score higher on the *HSTW* Assessment than those who do no homework.

Fifty-three percent of vocational students in 2000 said they did no homework for vocational classes in a typical week. One indication that low expectations still prevail is the fact that 56 percent of students at *HSTW* sites in 2000 spent less than an hour per week reading outside of class. Even though teachers often say students do not have time to complete challenging assignments outside of class, 70 percent of students said they watched at least two hours of television daily. Students who watched television one hour or less each day had average scores that met the *HSTW* achievement goals in reading.

6. It matters that students receive the extra help needed to meet higher standards.

Giving students extra help to meet higher standards shows them that the school and their teachers believe they can learn challenging materials. Students at high-achieving schools have better access to extra help. For example, 64 percent of the students at high-achieving schools — compared with 47 percent of students at low-achieving schools — said their teachers were frequently available. Further, more students at high-achieving schools than at low-achieving schools received the extra help they needed to do better in mathematics. As more vocational students take high-level courses, there is a greater need to provide them with extra help to meet course

standards. Sixty-eight percent of students at *HSTW* sites received extra help in mathematics; only 41 percent of students received extra help in English. Considering that reading achievement is lower than mathematics achievement, why is there this difference in extra help? Students do not recognize that they have deficiencies and need extra help until they are required to take more demanding courses. A smaller percentage of students at *HSTW* sites are enrolled in higher-level English courses than in higher-level mathematics courses — 45 percent and 85 percent, respectively.

7. It matters that students receive early and continual guidance and advisement from caring adults.

Student achievement improved between 1996 and 1998 in *HSTW* sites that increased the amount of time available for students to talk with counselors and teachers about planning a program of study, according to a study by the Research Triangle Institute. Achievement in mathematics and science declined in schools that decreased the time that teachers and counselors worked with individual students in developing four-year educational plans. Students at *HSTW* sites in 2000 who received guidance about post-secondary study had average scores of 277 in reading, 300 in mathematics and 290 in science; students who did not receive this guidance had average scores of 270 in reading, 297 in mathematics and 286 in science.

To raise student achievement, it is essential to have a strong system for guidance and advisement that involves parents as well as students. To get students to complete demanding academic and technical studies, counselors or teacher-advisers need to help each student in setting goals for after high school, developing and pursuing a program of study aligned to those goals, reviewing progress each year, and making necessary adjustments to the program of study.

Early and continual advisement for vocational students and their parents is essential for five reasons:

- Guidance is linked to higher achievement. The 34 percent of students who received plan-

ning assistance about courses to take in high school had higher achievement. The students who often were encouraged to take more challenging mathematics and science courses — 23 percent and 17 percent, respectively — had higher achievement.

- More than 72 percent of vocational students plan to continue their studies after high school graduation, despite the widespread perception that they are incapable of meeting high standards.
- Only about half of these students are proficient enough in reading, mathematics and science to begin college-level studies without first taking many remedial courses.
- Many of these students do not know that they lack the knowledge and skills for further learning. Early guidance will show students the courses they need. Sixty-six percent of vocational students said that, before they began ninth grade, they received no guidance in which courses to take in high school.
- A planning meeting will help each student and his or her parents see that a rigorous curriculum in high school is important in opening doors to opportunities after graduation. More parents need to understand the critical roles that courses such as geometry, Algebra II, chemistry, physics and college-preparatory English play in preparing students for the workplace and further study.

Guidance and advisement for vocational students

The 2000 *HSTW* Assessment of seniors indicated that many schools need to strengthen their guidance and advisement systems.

- Twenty-one percent of students received no help from teachers or counselors in developing a program of study for high school.
- Sixty-six percent said their parents did not meet with them and school representatives to plan high school programs of study.

Schools need to make even more progress in involving parents in the guidance process. Parents should meet with their child and a teacher or counselor each year, beginning when the student is in eighth grade. Parents can reinforce efforts to get students to work hard and meet higher achievement standards. Between 1994 and 2000, the percentage of students at *HSTW* sites who said they met with their parents and school representatives to develop four-year programs of study increased from 19 percent to 34 percent.

As a result of weak guidance systems and low parental involvement, about one-fifth of students

at *HSTW* sites in 2000 were dissatisfied with the help they received in setting goals for after high school and in planning programs of study to move them toward these goals. State policies on guidance and advisement can contribute to higher achievement. However, only seven consortium states (Indiana, Mississippi, North Carolina, Ohio, South Carolina, Tennessee and West Virginia) require schools to assist all students in developing four-year programs of study. **More students in these states than in other states report getting help before grade nine in planning what they will study in high school.**

8. It matters that students meet curriculum and achievement goals.

Students who complete the *HSTW*-recommended curriculum and meet the *HSTW* achievement goals receive the Award of Educational Achievement. (See the *HSTW*-recommended curriculum in the sidebar on page 6.) This award recognizes outstanding student achievement and addresses the 1988 SREB goal of establishing more precise, demanding and measurable academic standards for vocational students. More than 8,800 students — 31 percent of students who completed vocational concentrations at *HSTW* sites — earned the award

in 2000. These students had average achievement scores that equaled or exceeded those of college-preparatory students nationally. (See Table 12.)

It does matter that vocational students meet curriculum and achievement goals. Follow-up studies at colleges and universities in North Carolina, Oklahoma, South Carolina and West Virginia compared the achievement of award recipients with that of other high school graduates. Students who completed the *HSTW*-recommended curriculum and met the *HSTW* achievement goals:

Table 12
Achievement of *HSTW* award recipients and nonrecipients compared with that of college-preparatory students nationally

	Percent of all <i>HSTW</i> students assessed in 2000	Average scores		
		Reading	Mathematics	Science
Award recipients	31%	300	322	316
Award nonrecipients	69%	264	289	277
College-preparatory students	Not applicable	302	317	307

Note: National college-preparatory students are 12th-graders who took the National Assessment of Educational Progress exams and indicated that they were pursuing a college-preparatory curriculum.

- took fewer remedial courses in language arts/reading and mathematics;
- were more likely to return to college after their freshman year; and
- had higher grade-point averages in their freshman year.

Compared with those who didn't receive the award, *HSTW* award recipients are:

- more likely to enroll in further study (83 percent, compared with 56 percent);
- more likely to attend four-year colleges (53 percent, compared with 25 percent);
- less likely to need remedial courses (15 percent, compared with 31 percent); and
- less likely to be unemployed for more than eight weeks during the year after graduation (17 percent, compared with 25 percent).

The curriculum and achievement goals that contribute to success in college also give high school graduates access to good jobs. Leaders at BellSouth and IBM administered their employment tests to *HSTW* award recipients in selected states. BellSouth found that 90 percent of the award recipients passed the tests, compared with 60 percent of the company's pre-screened applicants. Sixty percent of award recipients passed BellSouth's electricity test, compared with 30 percent of the pre-screened applicants. When

IBM administered its test in North Carolina, the company found that award recipients scored at the same level as graduates of community colleges.

If a much larger percentage of vocational students were to earn the Award of Educational Achievement, the impact on the region's productivity and earnings growth could be substantial. The award signifies that high school graduates are ready for the workplace and further education. It means that they have taken the "right courses" in high school and have demonstrated the academic and technical knowledge and skills that college faculty and employers value. Taking steps to increase the number of students who earn the award would be a wise investment for any state or school.

One of the SREB-State Vocational Education Consortium goals in 1988 was to increase the percentage of students who complete a planned sequence of career/technical courses and continue their education within one year of graduation. According to *HSTW* studies of students who completed career/technical sequences, the percentage who enrolled (part time or full time) in postsecondary study within one year of graduation increased from 49 percent in 1989 to 64 percent in 1999. Furthermore, 83 percent of *HSTW* award recipients enrolled in postsecondary study in 1999.

9. It matters that vocational students are held to demanding standards for technical achievement.

Five consortium states (Mississippi, North Carolina, Ohio, Oklahoma and Pennsylvania) have ways to measure the technical literacy of vocational students. Technical literacy is the ability to:

- apply academic knowledge and skills to technical studies;
- read, understand and communicate in the language of the technical field;

- understand technical concepts and principles; and
- use technology to complete projects in a career/technical field.

For example, Oklahoma gives end-of-program exams in broad fields of vocational study (such as manufacturing, agriculture or electronics). That state also requires all high schools and vocational/technical schools to give 12th-graders in programs geared toward a specific occupation either

a state-developed occupational exam or a state exam for occupational certification. The state provides schools with reports on their students' performance on the exams. Each school is asked to set goals for improvement. If a school does not improve within three years, it is required to develop a plan for improvement and get it approved by the state.

As a result of legislation passed in 2000, West Virginia will include the *HSTW* Assessment and

the Award of Educational Achievement in its plan to improve schools. The assessment and award will be used to determine whether students are taking the right courses and whether the standards are high enough to prepare them for the workplace or postsecondary study. All high schools in the state will receive reports on results of the assessment; they can use this information in improving what and how students are taught as well as the guidance and advisement services offered to students.

What actions can states and local school districts take to improve high schools for vocational students?

The *High Schools That Work* goal is for public high schools to help more students meet high standards by building educational programs around college-preparatory-level academic studies and challenging career concentrations. The *HSTW* initiative has grown from 28 schools in 13 states in 1987 to 1,081 schools in 23 states in 2000 (12 percent of the consortium states' public high schools). The participation ranges from 77 percent of public schools in West Virginia to 2 percent in Kansas. (See Table 13.)

The SREB-State Vocational Education Consortium's long-range goal is not to involve every high school in every state in the *HSTW* network. Rather, the goal is to incorporate the lessons learned from *HSTW* into the state and local policies, leadership, assessment and support initiatives needed to get 85 percent of vocational students to meet the *HSTW* achievement goals for reading, mathematics and science.

The **first lesson** is that students cannot learn what they are not taught. States and local school districts can create policies that require all students to complete at least the *HSTW*-recommended curriculum in order to graduate from high school. States and local districts should take the following actions:

- Require all students to complete four college-preparatory-level courses in English/language arts. Only New York has this requirement.

States and local school districts need to define the standards for college-preparatory-level English courses, including the number and variety of books and materials to be read and analyzed and the amount of quality writing to be done. States and local districts should consult the language arts standards of the Council for Basic Education in crafting their expectations for a college-preparatory curriculum in language arts.

- Require all students to take at least three mathematics courses in grades nine through 12. Two of these courses should be college-preparatory-level Algebra I, Algebra II, geometry or higher-level mathematics. Eleven consortium states (Florida, Georgia, Hawaii, Indiana, Kansas, Maryland, Massachusetts, Ohio, Pennsylvania, South Carolina and Tennessee) do not require or systematically encourage all students to complete three mathematics courses, including two college-preparatory-level courses.
- Require all students to complete at least three science courses, including two courses in college-preparatory-level chemistry, physics, applied physics or biology. Fifteen consortium states (Alabama, Florida, Georgia, Hawaii, Indiana, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Mississippi, North Carolina, Ohio, Pennsylvania and Tennessee)

Table 13
Numbers and percentages of public high schools
using the *HSTW* school-improvement design

	Number of high schools in the state	Number of schools in <i>HSTW</i>	Percentage of schools in <i>HSTW</i>
Alabama	470	46	10%
Arkansas	322	22	7
Delaware	29	7	24
Florida	383	41	11
Georgia	344	130	38
Hawaii	43	12	28
Indiana	348	19	5
Kansas	355	7	2
Kentucky	324	93	29
Louisiana	318	68	21
Maryland	221	24	11
Massachusetts	360	25	7
Mississippi	233	15	6
New York	908	11	1
North Carolina	387	94	24
Ohio	721	43	6
Oklahoma	586	53	9
Pennsylvania	688	55	8
South Carolina	208	34	16
Tennessee	348	60	17
Texas	1,162	47	4
Virginia	287	54	19
West Virginia	150	116	77
Total	9,195	1,076	12

do not require three science courses, including two college-preparatory-level courses.

- Require all students to complete at least four courses in either an academic concentration or a career concentration in addition to an upgraded academic core. Seventeen consortium states (Arkansas, Delaware, Florida, Hawaii, Indiana, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas and Virginia) do not have this requirement.

The **second lesson** is that students who meet curriculum and achievement goals are better prepared for employment and further learning. States can set accountability standards that require each school to increase annually the percentage of students who meet both curriculum and achievement goals in reading, mathematics and science.

The **third lesson** is that measuring and reporting how well students have learned what they are supposed to learn in vocational classes will increase the quality of vocational programs. States and local school districts need to develop end-of-program assessments for broad fields of vocational studies (such as manufacturing, agriculture or electronics) to measure whether students understand major technical concepts; can read, comprehend and use technical information; and can use mathematical and scientific knowledge and skills to solve real-world problems.

The **fourth lesson** is that well-prepared teachers can teach higher-level academic content to more students. To prepare teachers, states and local school districts can take the following actions:

- Revise programs for teacher preparation and certification to teach new vocational teachers how to incorporate academic skills into vocational courses.
- Provide vocational teachers with staff development in integrating state standards for reading, writing and mathematics into vocational

assignments, exams and classroom assessment guides.

- Provide staff development to ensure that all teachers can get students to achieve at higher levels. Funding for staff development should be linked to 1) the more demanding subject matter that teachers are expected to know and teach; 2) the school improvement plan; and 3) the changes to the curriculum and instruction that are necessary for the school to improve student achievement.

The **fifth lesson** is that vocational students achieve at a higher level when they receive early and ongoing information and advice about their postsecondary options and about the high school courses that will prepare them for work and further education. States and local school districts can create policies and leadership initiatives to encourage schools to develop guidance and advisement systems that help students plan and complete challenging programs of study with support from their parents.

The **sixth lesson** is that some students need extra help to meet higher standards. States and local school districts can provide funding to help schools in offering summer programs in reading, writing and mathematics; providing extra help before and after school; and creating a schedule that allows time for ninth-graders to take “catch-up” courses in English and mathematics.

The **seventh lesson** is that students perform better in high school if they enter ninth grade prepared to complete the *HSTW*-recommended curriculum. Each state needs to develop a policy for the transition from the middle grades to high school. At the minimum, this policy should:

- set readiness indicators for doing high school work — including a requirement that all students complete either pre-algebra or Algebra I by the end of grade eight;
- require leaders in high schools and middle schools to work together — starting with grade seven — to increase annually the percentage of students who successfully complete

college-preparatory Algebra I and college-preparatory/honors language arts by the end of grade nine; and

- require high schools and middle schools to work together to educate parents and students about the knowledge and skills needed to do high school work. These efforts need to include working with each student and his or her parents to develop by the end of eighth grade a challenging program of study for high school.

The **eighth lesson** is that many high schools need outside support and usable data to become high-performing schools. States can establish teams of experts to help low-performing schools and schools that are not improving. States also can improve school leaders' use of state testing data by collecting information about students' school experiences — such as courses taken and the amount of effort required — and by providing schools with reports that link achievement to the quality of students' educational experiences.

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